EXHIBIT C

Singular Computing LLC v. Google LLC

C.A. No. 1:19-cv-12551-FDS

Google's Trial Exhibit List

Trial Exhibit No.	Date	Description	Begin Bates	End Bates	Objections
827		Other Transaction for Prototype Agreement between Intrinsix and Space and Naval Warfare Systems Center Pacific Concerning Revolutionizing the Nation's ISR and Computer Vision Capabilities by Accelerating Exploitation of Approximate Computing Technology (2014)	SINGULAR-00004187	SINGULAR-00004224	
828	6/6/2013	Design Agreement between Intrinsix and Singular Computing	SINGULAR-00004225	SINGULAR-00004279	
838		Singular Computing End User License Agreement for Evaluating Singular Technology	SINGULAR-00010314	SINGULAR-00010315	
839	9/23/2015	Sandia National Laboratories Invoice to Singular Computing	SINGULAR-00011044	SINGULAR-00011044	
844		September 3, 2015 "Singular Architecture Specification" Revision 16	SINGULAR-00014320	SINGULAR-00014373	
899	2/20/2018	Email from Bates to Kibune re: quote attaching Singular Quote for Fujitsu 20Feb2018.pdf	SINGULAR-00020490	SINGULAR-00020490	
926	9/18/2017	Services and Evaluation License Agreement between Apple and Singular Computing	SINGULAR-00036184-AAPL	SINGULAR-00036191-AAPL	
927		Singular Computing End User License Agreement for Evaluating Singular Technology	SINGULAR-00050752	SINGULAR-00050754	
1009		Sandia National Labs, Holzrichter and Spaulding, Convolutional Back Projection on the S1 Reduced Precision Processor	SNL-0001657	SNL-0001657	402, 403, 802
1010	9/8/2020	Email from Bates to Holzrichter re Interest from Sandia National Lab's Synthetic Aperture Radar Business Area	SNL-0002082	SNL-0002082	402, 403
1011	7/11/2016	Email from Spaulding to Holzrichter re Do you have time for a chat about the S1?	SNL-0000643	SNL-0000643	402, 403, 802
1014	9/8/2020	Email from Holzrichter to Bates re We wish to run an abstract that we hope to submit to a conference past you	SNL-0001658	SNL-0001658	402, 403, 802
1015	9/8/2020	Email from Holzrichter to Bates re Early S1 results	SNL-0001695	SNL-0001695	402, 403, 802
1033	3/27/2013	Independent Contractor Agreement IC1202401 between Singular Computing and Charles River Analytics	CRA0001285	CRA0001297	402, 403
1034	3/7/2012	Independent Contractor Agreement IC1202601 between Singular Computing and Charles River Analytics	CRA0001349	CRA0001353	402, 403
1035	9/4/2014	Letter from Felix at CRA to Foster (ONR) re Request to Remove Singular Technology as a Subcontractor and Add Singular License Agreement	CRA0001996	CRA0001997	802, 402, 403
1037	10/00/2013	License Agreement between Singular Computing and Charles River Analytics	CRA0002063	CRA0002074	402, 403, Subject to MIL
1040	11/18/2013	Email from Wronski to Felix re a request, and ideas for moving the license forward	CRA0000144	CRA0000146	802, 402, 403
1052	08/2009	ISR Software on Approximate Hardware	SINGULAR-00004331	SINGULAR-00004343	802
1053	01/2010	Computing 10,000x More Efficiently (Focus on Video Analysis), Joe Bates and Deb Roy	SINGULAR-00007942	SINGULAR-00007954	802
1055	3/30/2011	Overview of work related to Singular Computing, Joseph Bates	SINGULAR-00005482	SINGULAR-00005487	802
1056	4/19/2016	Many accurate enough chips will use software for correction to achieve up to 10,000 times higher speed and lower power usage, NextBigFuture.com			402, 403, 802
1058	6/29/2011	Email from Bates to Teller re complaints	SINGULAR-00026986	SINGULAR-00026987	802

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Trial Exhibit No.	Date	Description	Begin Bates	End Bates	Objections
1064	9/18/2017	Service and Evaluation License Agreement between Apple and Singular Computing LLC	SINGULAR-00012052	SINGULAR-00012059	No objection
1065	9/21/2017	Email from Bates to Bedichek, Evermann, Zimmerman re as we begin	SINGULAR-00046450-AAPL	SINGULAR-00046450-AAPL	402, 403, 802
1067	5/3/2018	Email from Ozgen to Bates re Apple	SINGULAR-00034663-AAPL	SINGULAR-00034663-AAPL	402, 403, Subject to MIL
1068	06/00/2018	Deep Learning S1 Results + S2 Future	SINGULAR-00034708-AAPL	SINGULAR-00034722-AAPL	402, 403, 802
1069	4/1/2018	Research Agreement between Fujitsu Laboratories LTD and Fujitsu Consulting (Canada) Inc. and Singular Consulting	SINGULAR-00012070	SINGULAR-00012083	402, 403, 802
1070	11/5/2009	Letter from Bates to Colwell re Introduction	SINGULAR-00004281	SINGULAR-00004282	802, 402, 403
1071	10/22/2013	Imperfect Processing: A Functionally Feasible (and Fiscally Attractive) Option, Says Singular Computing, Berkeley Design Technology			402, 403, 802, Not previously produced
1073	5/12/2019	Email from Hammerstrom to Bates re X1	SINGULAR-00021150	SINGULAR-00021150	611, 403, 802
1076	6/25/2018	Holzrichter and Spaulding, Convolutional Back Projection on the S1 Reduced Precision Processor	SNL-0001469	SNL-0001469	402, 403, 701, 802
1078	12/14/2017	Email from Bates to Struever et al., re a new member of Singular	SINGULAR-00026332	SINGULAR-00026334	402, 403, 802
1081	7/6/2018	Email from Bates to Murati, Zaremba, et al., cc Ozgen re slides from today's Singular discussion with email attachment - OpenA1 6July2018.pdf (Billion Core Computing)	SINGULAR-00013844	SINGULAR-00013972	402, 403, 802
1082	3/28/2019	Email from Kibune to Bates re Feedbacks to our collaboration (Kibune@Fujitsu)	SINGULAR-00051983-FUJITSU	SINGULAR-00051983-FUJITSU	402, 403, 802
1083		2012-2020 Income & Expense Spreadsheet	SINGULAR-00054009	SINGULAR-00054009	402, 403, 802
1084	05/00/2002	Library of Parameterized Hardware Modules for Floating-Point Arithmetic with an Example Application, A Thesis Presented by Belanovic	SINGULAR-00002261	SINGULAR-00002343	Subject to IPR Estoppel, 402, 802, MIL
1107	1/21/2018	Email from Bates to Zimmerman re tpu2	SINGULAR-00047129-AAPL	SINGULAR-00047130-AAPL	802, 402, 403
1170	5/16/2018	Email from Ozgen to Tran re Crypto currency mining chip - company intro	OZGEN_00000159	OZGEN_00000159	402, 403, 802
1171	4/11/2018	Email from Ozgen to Bates re market + pitch deck	SINGULAR-00023291	SINGULAR-00023292	402, 403, 802
1172	3/9/2018	Email from Ozgen to Bates re other people I contracted	SINGULAR-00023101	SINGULAR-00023101	402, 403, 802
1177	5/11/2018	Email from Bates to Seseri, cc Ozgen re Josh Tenenbaum and Sandy Pentland suggested I contact you	SINGULAR-00019051	SINGULAR-00019052	802, 402. 403
1178	5/18/2018	Email from Bates to Seseri, cc Tenenbaum, Pentland, Ozgen re Josh Tenenbaum and Sandy Pentland suggested I contact you	SINGULAR-00024608	SINGULAR-00024609	402, 403, 802
1179	5/27/2018	Email from Ozgen to Maniaci re Crypto currency mining chip - company intro	OZGEN_00000067	OZGEN_00000067	402, 403, 802
1180	6/8/2018	Email from Ozgen to Bates re Fwd: Singular Computing - information	OZGEN_00000053	OZGEN_00000054	402, 403, 802
1181	7/6/2018	Email from Bates to Murati, Zaremba, et al., cc Ozgen re slides from today's Singular discussion (w/o attachment)	SINGULAR-00013844	SINGULAR-00013844	402, 403, 802
1217	6/6/2013	Intrinsix-Singular Design Agreement	SINGULAR-00026441	SINGULAR-00026495	402, 403, subject to MIL
1251	9/17/2019	U.S. Patent No. 10,416,961 (Bates)			402, 403, Subject of MIL
1252		U.S Patent No. 10,416,961 File History for Application No. 16/175,131			402, 403, Subject of MIL
1259	6/19/2009	U.S. Provisional Patent Application No. 61/218,691			No objection (duplicate of TTX1460)

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Trial Exhibit No.	Date	Description	Begin Bates	End Bates	Objections
1260	05/00/2002	Belanovic Thesis, Library of Parameterized Hardware Modules for Floating-Point Arithmetic with an Example Application	GOOG-SING-00020062	GOOG-SING-00020144	802, Subject to IPR Estoppel Order (ECF No. 447)
1301	12/8/2017	Machine Learning for Systems and Systems for Machine Learning, Jeff Dean - Google Brain Team	GOOG-SING-00002124	GOOG-SING-00002177	No objection
1302	12/9/2015	Jellyfish numerics validation	GOOG-SING-00004735	GOOG-SING-00004781	802
1303	06/07/2019	BarnaCore Specification	GOOG-SING-00010082	GOOG-SING-00010131	402, 403, 802
1305	7/23/2020	TensorCore Instruction Set Architecture	GOOG-SING-00010508	GOOG-SING-00010582	802
1308	4/16/2019	U.S. Patent No. 10,261,786 (Lacy)	GOOG-SING-00019948	GOOG-SING-00019964	402, 403, 611, Subject of MIL
1309	4/14/2020	U.S. Patent No. 10,621,269 (Phelps)	GOOG-SING-00019965	GOOG-SING-00019990	402, 403, 611, Subject of MIL
1310	6/30/2020	U.S. Patent No. 10,698,976 (Phelps)	GOOG-SING-00019991	GOOG-SING-00020012	402, 403, 611, Subject of MIL
1311	7/18/2017	U.S. Patent No.9,710,748 (Ross)	GOOG-SING-00020013	GOOG-SING-00020029	402, 403, 611, Subject of MIL
1312		Belanović & Leeser, A Library of Parameterized Floating-Point Modules and Their Use,	GOOG-SING-00020145	GOOG-SING-00020154	402, 802, Subject to IPR Estoppel Order (ECF No. 447)
1313		Computer Organization & Design The Hardware/Software Interface	GOOG-SING-00022064	GOOG-SING-00022144	802
1316		Shirazi et al., Quantitative Analysis of Floating Point Arithmetic on FPGA Based Custom Computing Machines	GOOG-SING-00023790	GOOG-SING-00023797	802, Subject to IPR Estoppel Order (ECF No. 447)
1317	9/00/2007	Sudha et al., An Efficient Digital Architecture for Principal Component Neural Network and its FPGA Implementation	GOOG-SING-00023801	GOOG-SING-00023807	802, Subject to IPR Estoppel Order (ECF No. 447)
1318	1/8/1985	U.S. Patent No. 4,493,048 (Kung)	GOOG-SING-00025230	GOOG-SING-00025247	802, Subject to IPR Estoppel Order (ECF No. 447)
1319		Tong et al., Minimizing Floating-Point Power Dissipation Via Bit-Width Reduction	GOOG-SING-00025248	GOOG-SING-00025252	802, Subject to IPR Estoppel Order (ECF No. 447)
1320		Tong et al., Reducing Power by Optimizing the Necessary Precision/Range of Floating-Point Arithmetic	GOOG-SING-00025253	GOOG-SING-00025266	802, Subject to IPR Estoppel Order (ECF No. 447)
1321		Kung &Leiserson, Systolic Arrays for (VLSI)	GOOG-SING-00026128	GOOG-SING-00026161	802, Subject to IPR Estoppel Order (ECF No. 447)
1322		Kung, Why Systolic Architectures?	GOOG-SING-00026162	GOOG-SING-00026171	802, Subject to IPR Estoppel Order (ECF No. 447)
1323	08/30/2010	Xilinx Virtex-4 Family Overview v3.1 Product Specification	GOOG-SING-00026243	GOOG-SING-00026251	802, Subject to IPR Estoppel Order (ECF No. 447)
1324	09/28/2006	Xilinx Floating-Point Operator v.3.0 Product Specification	GOOG-SING-00026252	GOOG-SING-00026279	802, Subject to IPR Estoppel Order (ECF No. 447)
1325	05/15/2008	Xilinx XtremeDSP for Virtex-4 FPGAs v2.7 User Guide	GOOG-SING-00026280	GOOG-SING-00026400	802, Subject to IPR Estoppel Order (ECF No. 447)
1327	6/3/2014	State of Work No. 1 for Project GApp	GOOG-SING-00026526	GOOG-SING-00026554	No objection
1329	12/12/2018	MLPerf Training v.0.5 Results	GOOG-SING-00026685	GOOG-SING-00026686	802
1332		IEEE Std 754 - 2008, IEEE Standard for Binary Floating-Point Arithmetic	GOOG-SING-00026950	GOOG-SING-00027019	802
1333		What do we study?	GOOG-SING-00027044	GOOG-SING-00027050	402, 802
1343	10/31/2019	Chippy3 review	GOOG-SING-00081019	GOOG-SING-00081059	402
1347	08/00/2020	Platform for Machine Learning -v2	GOOG-SING-00112291	GOOG-SING-00112319	No objection
1351	09/15/2016	Dragonfish Planning Phase Entry PPR presentation	GOOG-SING-00141268	GOOG-SING-00141327	802
1355	8/23/2019	Notes on TPU Utilization	GOOG-SING-00150961	GOOG-SING-00150971	802
1358	5/14/2015	Silverback, Water cooled 84 kW rack for Jellyfish	GOOG-SING-00201434	GOOG-SING-00201454	402, 403, 802

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1361	7/31/2017	PVT 1 & 2 Thermal & Hydraulic Characterization/Qual LQ1 Meeting	GOOG-SING-00207436	GOOG-SING-00207490	402, 403, 802
1369		Excel Spreadsheet	GOOG-SING-00239509	GOOG-SING-00239509	802
1371	8/17/2020	Measuring the Scaling of Embedding on TPUs vs. GPUs	GOOG-SING-00240599	GOOG-SING-00240600	802
1375	07/27/2015	Statement of Work No. 3 between Google Inc. and Avago Technologies International Sales Pte. Ltd	GOOG-SING-00241367	GOOG-SING-00241417	402, 403, 802
1377	8/24/2015	JF Packaging Specifications and Overview	GOOG-SING-00241457	GOOG-SING-00241485	402, 802
1383	2/28/2023	Efficiency Data Centers Google	GOOG-SING-00241573	GOOG-SING-00241580	402, 802
1384	8/21/2016	Why R&D Spending Is Not A Measure of Innovation	GOOG-SING-00241865	GOOG-SING-00241869	402, 403, 802
1385		Google Machine Learning Glossary	GOOG-SING-00241895	GOOG-SING-00242130	802
1386		Google Cloud Introduction to Cloud TPU	GOOG-SING-00242135	GOOG-SING-00242141	802
1387		Google Data Centers Efficiency	GOOG-SING-00242142	GOOG-SING-00242150	802
1388		Google Software Engineer Salary Levels.fyi	GOOG-SING-00242151	GOOG-SING-00242156	402, 403, 802
1389		Google Workspace Empowering everyday innovation to build a more adaptive business	GOOG-SING-00242157	GOOG-SING-00242169	402, 802
1390	6/28/2021	TPU vs GPU Pros and Cons	GOOG-SING-00242170	GOOG-SING-00242174	802, 402, 403, 106
1391	7/9/2021	Price-to-Research Ratio - PPR Definition	GOOG-SING-00242175	GOOG-SING-00242181	402, 403, 802
1392	3/8/2017	How did Google surpass all the other search engines	GOOG-SING-00242182	GOOG-SING-00242184	402, 403, 802
1393		Merriam-Webster - teraflop	GOOG-SING-00242185	GOOG-SING-00242185	802
1394	12/12/2018	ML Commons - v0.5 Results	GOOG-SING-00242186	GOOG-SING-00242189	402, 802, 901
1395	6/10/2019	ML Commons - v0.6 Results	GOOG-SING-00242190	GOOG-SING-00242193	402, 802, 901
1396	6/21/2021	Which Companies Spend the Most in Research and Development	GOOG-SING-00242194	GOOG-SING-00242202	402, 403, 802
1397		Nvidia - What is MLPerf	GOOG-SING-00242203	GOOG-SING-00242212	402, 802, 901
1398	08/00/2011	Lecture Notes on Vertical Structure	GOOG-SING-00242213	GOOG-SING-00242238	402, 802
1399		Pitchbook - Singular Computing Overview	GOOG-SING-00242239	GOOG-SING-00242242	402, 403, 802
1401		Singular Computing The Performance of Specialized Deep Learning Hardware in Programmable General Purpose Computing Systems	GOOG-SING-00242259	GOOG-SING-00242259	802
1402		Apportionment of Intellectual Property Value Where Economic Theory Meets Legal Practice	GOOG-SING-00242260	GOOG-SING-00242268	802, 611, Improper instruction re law
1403		Verified Salary Stream Levels.fyi	GOOG-SING-00242269	GOOG-SING-00242270	402, 403, 802
1404	3/18/2019	Automatic Mixed Precision for NVIDIA Tensore Core Architecture in TensorFlow	GOOG-SING-00242271	GOOG-SING-00242273	402, 802
1406		U.S. Patent Application 12/816,201 (Bates)	GUSTAFSON000011	GUSTAFSON000074	402, 403
1407	3/21/1985	Standards Committee of the IEEE Computer Society, ANSI/IEEE Std 754 - 1985, IEEE Standard for Binary Floating-Point Arithmetic	GUSTAFSON000094	GUSTAFSON000113	402, 403, 802
1408	03/00/2016	Berkeley J. Bates Seminar, YouTube Transcript	GUSTAFSON000130	GUSTAFSON000164	402, 802
1409	2016	Berkeley J. Bates Seminar, YouTube Video	GUSTAFSON000165	GUSTAFSON000165	402, 802
1410	10/15/1993	Adaptive Solutions, Inc., CNAPS Data Book	HAMMERSTROM-00000001	HAMMERSTROM-00000258	402, 802, Subject to IPR Estoppel Order (ECF No. 447)
1411	3/7/1990	Adaptive Solutions, Inc., x1 Programmer's Guide and Reference Manual	HAMMERSTROM-00000259	HAMMERSTROM-00000474	402, 802, Subject to IPR Estoppel Order (ECF No. 447)
1412	10/15/1993	Adaptive Solutions, Inc., Getting Acquainted with CNAPS	HAMMERSTROM-00000475	HAMMERSTROM-00000548	402, 802, Subject to IPR Estoppel Order (ECF No. 447)

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1413	3/15/1996	Adaptive Solutions, Inc., CNAPS-C Programming Guide	HAMMERSTROM-00000549	HAMMERSTROM-00000684	402, 802, Subject to IPR Estoppel Order (ECF No. 447)
1414	12/6/1990	An American National Standard IEEE Standard for Binary Floating-Point Arithmetic	LEESER000001	LEESER000026	402, 802, Not timely disclosed
1415		Xilinx XC4010D, XC4013D Logic Cell Array	LEESER000105	LEESER000106	402, 802, Subject to IPR Estoppel Order (ECF No. 447), Not timely disclosed
1416	9/23/2008	Xilinx Virtex-5 Family Overview Advance Product Specification	LEESER000107	LEESER000119	402, 802, Subject to IPR Estoppel Order (ECF No. 447), Not timely disclosed
1418		Leeser et al., Applying Reconfigurable Hardware to the Analysis of Multispectral and Hyperspectral Imagery	LEESER000122	LEESER000129	402, 802, Not timely disclosed
1419		Diefendorff, Pentium III = Pentium II + SSE Internet SEE Architecture Boosts Multimedia Performance	LEESER000130	LEESER000136	402, 802, Not timely disclosed
1420		Leeser and Belanovic, A Library of Parameterized Hardware Modules for Floating Point Arithmetic and Its Use	LEESER000158	LEESER000184	402, 802, Not timely disclosed, Subject to IPR Estoppel Order (ECF No. 447)
1421		Belanovic and Leeser, A Library of Parameterized Hardware Modules for Floating-Point Arithmetic and Their Use	LEESER000311	LEESER000312	402, 802, Subject to IPR Estoppel Order (ECF No. 447)
1422		Wang and Leeser, A Parameterized Floating Point Library Applied to Multispectral Image Clustering	LEESER000313	LEESER000346	402, 802, Not timely disclosed
1423		Leeser et al, A Parameterized Floating-Point Library Applied to Multispectral Image Clustering	LEESER000347	LEESER000348	402, 802, Not timely disclosed
1424		Source Code Printout	SING-SC-0000001	SING-SC-0000143	402, 403
1427	9/17/2019	U.S. Patent No. 10,416,961 (Bates)	SINGULAR-00001863	SINGULAR-00001892	402, 403
1429	3/26/2013	U.S. Patent No. 8,407,273 (Bates)	SINGULAR-00001921	SINGULAR-00001949	No objection
1431		Bates, Practical Approximate Computing	SINGULAR-00007237	SINGULAR-00007255	802
1432		Google - Jeff Dean & Oriol Vinals ("Binyal") - Tensor Flow	SINGULAR-00008401	SINGULAR-00008402	402, 802
1433	06/00/2017	Singular S1 Overview Revision 3	SINGULAR-00009701	SINGULAR-00009723	402, 403, 802
1434	5/15/2017	Fujitsu Change Order 1	SINGULAR-00010328	SINGULAR-00010332	402, 802
1435	3/17/2017	Singular Quote for Fujitsu	SINGULAR-00010388	SINGULAR-00010388	402, 403, 802
1436	7/2018	Billion Core Computing Preview	SINGULAR-00010574	SINGULAR-00010575	802
1437	7/2018	Billion Core Computing Presentation	SINGULAR-00010636	SINGULAR-00010763	802
1438	7/2018	Billion Core Computing Presentation	SINGULAR-00010764	SINGULAR-00010803	802
1439	6/7/2018	Wojciech Zaremba - OpenAI	SINGULAR-00010993	SINGULAR-00011026	402, 802
1440	01/00/2015	Products and Services Price List Singular Computing LLC	SINGULAR-00011045	SINGULAR-00011045	402, 403, 802
1441		Excel Spreadsheet	SINGULAR-00011046	SINGULAR-00011046	402, 403, 802
1442	5/19/2015	[Translation] Notice of Reasons for Rejection	SINGULAR-00011754	SINGULAR-00011762	402, 403, 901, 611
1443	3/11/2011	Email from Leeser to Bates cc Bresler re "Numerical accuracy" research	SINGULAR-00018096	SINGULAR-00018097	402, 802
1444	3/5/2011	Email from Bates to Ng cc Teller re Tom Dean (GoogleX, "physically realistic" computing, guidance on image search problem)	SINGULAR-00018845	SINGULAR-00018849	802
1445	2/17/2012	Email from Bates to Krysiak cc Blohm re patent with attachment	SINGULAR-00021510	SINGULAR-00021570	402, 802
1446	3/22/2012	Email from Krysiak to Bates, Blohm re Tesla's Ambitions Fueled by Customer Down Payments - NYTimes.com	SINGULAR-00022184	SINGULAR-00022186	402, 802

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1447	12/27/2017	Email from Bates re Create a customer	SINGULAR-00023309	SINGULAR-00023309	402, 403
1448	2017	Billion Core MIT	SINGULAR-00025905	SINGULAR-00025909	802
1449	4/1/2017	Email from Bates to Linda Bates and Connolly re Singular K-1 (w/o attachment)	SINGULAR-00026335	SINGULAR-00026335	402, 403, 802
1450	8/22/2012	DARPA Volume I, Technical and Management Proposal, Revolutionizing the Nation's ISR and Computer Vision Capabilities by accelerating exploitation of Approximate Computing technology	SINGULAR-00032229	SINGULAR-00032275	402, 802
1452	1/21/2018	Email from Zimmerman to Bates re tpu2	SINGULAR-00036192-AAPL	SINGULAR-00036192-AAPL	802
1453	12/12/2016	Email from Fletcher to Bates re Henry, Tuesday	SINGULAR-00047229-AAPL	SINGULAR-00047231-AAPL	802
1454	3/22/2019	Email from Bates to Sasaki re Patents and Licensing for your Approximate Computing	SINGULAR-00053081-FUJITSU	SINGULAR-00053082-FUJITSU	402, 403, 802
1455	10/1/1999	Xilinx Virtex 2.5V Field Programmable Gate Arrays Preliminary Product Specification	XILINX-GOOG-SUB00000069	XILINX-GOOG-SUB00000139	402, 403, 802, Subject to IPR Estoppel Order (ECF No. 447)
1456	4/2/2001	Xilinx Virtex 2.5 v Field Programmable Gate Arrays Product Specification	XILINX-GOOG-SUB00000522	XILINX-GOOG-SUB00000597	402, 802, Subject to IPR Estoppel Order (ECF No. 447)
1457	5/21/2003	A Library for parameterized hardware molecules for floating point arithmetic and its use			402, 403, 802, Not previously produced, Subject to IPR Estoppel Order (ECF No. 447)
1458	11/18/2003	U.S. Patent No. 6,650,327 (Airey et al.)			402, 403, Not previously produced
1459	1/13/2009	U.S. Patent No. 7,478,047 (Loyall et al.)			402, 403, Not previously produced
1460	6/19/2009	Provisional Application No. 61/218,691			No objection (duplicate of TTX1259)
1461	12/23/2010	U.S. Patent Application Publication No. 2010/0325186 (Bates)			402, 403
1462	2/21/2013	Dean source code changelog file, subject to protective order			Not previously produced
1463	12/22/2015	U.S. Patent No. 9,218,156 B2			No objection
1464	5/17/2017	Provisional Application No. 62/507,748 (US 10,621,269)			402, 403
1465	8/25/2020	U.S. Patent No. 10,754,616 (Bates)			402, 403
1466	05/12/2021	Plaintiff's Response to Defendant's Third Set of Interrogatories & Supplemental Responses to Interrogatory Nos. 15 and 16			402, 403
1467	06/23/2021	Plaintiff's Response to Defendant's Fourth Set of Interrogatories Nos. 19-30)			402, 403
1468	06/23/2021	Plaintiff's Response to Defendant's First Set of Requests for Admission (Nos. 1-11)			402, 403
1469	7/23/2021	Plaintiff's Third Supplemental Response to Defendant's First Set of Interrogatories (No. 11)			402, 403
1470	10/04/2021	Plaintiff's Supplemental Response to Defendant's First Set of Requests for Admission (No. 2)			402, 403
1471	10/21/2021	Khatri IPR depo			Not evidence, 402, 403, 802, Form, Subject of MIL
1472	11/9/2021	U.S. Patent No. 11,169,775 (Bates)			402, 403
1473	02/00/2023	Train with Mixed Precision, User's Guide, NVIDIA docs			402, 403, 802, 901, Not previously produced
1474		ECEN 449- Microprocessor System Design, FGPA and Reconfigurable Computing			402, 403, 802, Not previously produced
1475		Mares Report Image 1			402, Not previously produced
1476		Mares Report Image 2			402, Not previously produced

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Trial Exhibit No.	Date	Description	Begin Bates	End Bates	Objections
1477		Patil et al, The Design Process for Google's Training Chips: TPUv2 and TPUv3			No objection
1478		Patterson, David - A.M. Turning Award Laureate			402, 403, 802, Not previously produced
1479		Physical Exhibit TPUv2 Board			Not previously produced
1480		Physical Exhibit TPUv3 Board			Not previously produced
1481		Physical Exhibit TPUv2 Chip			Not previously produced
1482		Physical Exhibit TPUv3 Chip			Not previously produced
1483		Physical Exhibit Wildstar board			Not previously produced, not identified in invalidity contentions
1484		Excel No Cloud & Global	GOOG-SING-00243994	GOOG-SING-00243994	402, 403
1485		Excel No Cloud & Global	GOOG-SING-00243995	GOOG-SING-00243995	402, 403
1486	1/21/2017	Email from Sexauer to Bates cc Spalink, Felten et al. re abstract/bio	GOOG-SING-00038611	GOOG-SING-00038616	No objection
1487	4/28/2023	Declaration of Dr. Joseph Bates [Dkt. 475-13]			802, 402, 403
1488	5/19/2023	Statement of Material Facts in Dispute re Defendant's Motion for Summary Judgment of Non-Infringement [Dkt. 505-1] (FILED UNDER SEAL)			402, 403
1489	5/11/2022	Final Written Decision for IPR2021-00165 Paper 57 (Non-Public Version - Protective Order Material)			MIL, 402, 403, subject to MIL
1490	5/11/2022	Final Written Decision for IPR2021-00165 Paper 57 (Public Version)			MIL, 402, 403, subject to MIL
1491	5/11/2022	Final Written Decision for IPR2021-00179 Paper 57 (Non-Public Version - Protective Order Material)			MIL, 402, 403, subject to MIL
1492	5/11/2022	Final Written Decision for IPR2021-00179 Paper 57 (Public Version)			MIL, 402, 403, subject to MIL
1493		Xcell, Vol. 32 (Q2 1999)	LEESER000041	LEESER000104	Subject to IPR estoppel, 802, 402, subject to MIL
1494	9/1/2022	Preliminary Program, FPL 2002 Agenda	LEESER000137	LEESER000145	Subject to IPR estoppel, 802, 402, subject to MIL
1495		VFLOAT: The Northeastern Variable precision FLOATing point library	LEESER000146	LEESER000150	Subject to IPR estoppel, 402, 802, subject to MIL
1496	6/20/2002	Module to perform addition or subtraction, VFLOAT Source Code	LEESER000185	LEESER000300	Subject to IPR estoppel, 402, 802, subject to MIL
1497		Variable Precision Floating Point Modules (Wayback Machine)	LEESER000301	LEESER000303	Subject to IPR estoppel, 402, 802, subject to MIL
1498	4/27/2005	Email from Leeser to mel@coe.ne.edu re MS Defense for Pavle Belanovic	LEESER000304	LEESER000304	Subject to IPR estoppel, 802, 402, subject to MIL
1499	9/24/2002	High Performance Embedded Computing Workshop 2002 Preliminary Agenda	LEESER000305	LEESER000310	Subject to IPR estoppel, 402, 802, subject to MIL
1500	6/20/2019	Accrual Basis January through December 2018	SINGULAR-00011489	SINGULAR-00011489	402, 403
1501		Singular Computing Status - November 2016	SINGULAR-00024106	SINGULAR-00024108	402, 403
1504	1/6/2017	Email from Teller to Bates et al re West Coast in February	SINGULAR- 00018179	SINGULAR- 00018179	802
1505		Singular Computing website			Not previously produced; not disclosed during discovery
1506	7/25/2015	Buganizer [Spec] NaN and inf behavior for all operations	GOOG-SING-00240607	GOOG-SING-00240621	802, 402, 403

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Trial Exhibit No.	Date	Description	Begin Bates	End Bates	Objections
1507		Buganizer [Spec] Define MXU reduced precision numerics	GOOG-SING-00240605	GOOG-SING-00240606	802, 402, 403
1508	2/2/2017	Email from Chen to Jouppi re [jellyfish-team] Re: 16 bit floats for machine learning inference and training	GOOG-SING-00162209	GOOG-SING-00162212	802, 402, 403
1509		Accelerating Deep Learning with Tensor Processing Units	GOOG-SING-00150347	GOOG-SING-00150382	802, 402, 403
1510	7/21/2008	Email from Bates to Bates re Rahul presentation with attachment	SINGULAR-00061402	SINGULAR-00061411	802, 402, 403
1511	2/0/2008	Singular Computing LLC Semiannual Status Report (and funding request)	SINGULAR-00060640	SINGULAR-00060654	802, 402, 403
1512	12/0/2008	Singular Computing LLC Status Report	SINGULAR-00060881	SINGULAR-00060890	802, 402, 403
1514	2/12/2008	Email from Leone to Bates re Reduced precision math	SINGULAR-00059707	SINGULAR-00059707	802, 402, 403
1515		Singular Computing Float Bits	SINGULAR-00059708	SINGULAR-00059710	802, 402, 403
1518		S1 chip/board sample photo - HIGHLY CONFIDENTIAL SOURCE CODE			No objection
1519	2/28/1990	A VLSI Architecture for High-Performance, Low Cost, On-Chip Learning	GOOG-SING-00025586	GOOG-SING-00025593	Subject to IPR estoppel, 402, 403, 802
1521	2/16/2011	Email from Cypher to Bates re SIMD, GoogleX	GOOG-SING-00028264	GOOG-SING-00028266	802, 402, 403
1522	2/3/2016	Jellyfish numerics validation	GOOG-SING-00240296	GOOG-SING-00240341	802, 402
1523	3/15/2022	U.S. Patent No. 11,275,992 (Norrie)			Subject to MIL, 402, 802
1524		Affidavit of Nathaniel E Frank-White and Internet Archive attachment			402, 403
1525		Leeser, et al., High-performance Transformation of Protein Structure Representation From Internal to Cartesian Coordinates			Subject to IPR estoppel, subject to MIL, 402, 802
1526		Leeser, et al., A Novel Physical Layer Authentication with PAPR Reduction based on Channel and Hard-are Frequency Responses			Subject to IPR estoppel, subject to MIL, 402, 802
1527		Leeser, et al., Identifying Volatile Numeric Expressions in Numeric Computing Application			Subject to IPR estoppel, subject to MIL, 402, 802
1528		Leeser, et al., VForce: An Environment for Portable Applications on High Performance Systems with Accelerators			Subject to IPR estoppel, subject to MIL, 402, 802
1529		Leeser, et al., The effect of temporal impulse response on experimental reduction of photon scatter in time-resolved diffuse optical tomography			Subject to IPR estoppel, 402, subject to MIL, 802
1530		Leeser, et al., An FPGA Design Technique to Receive Multiple Wireless Protocols with the Same RF Front End			Subject to IPR estoppel, 402, 802, subject to MIL
1531		Leeser, et al., State-action based Link Layer Design for IEEE 802.11b Compliant MATLAB-based SDR			Subject to IPR estoppel, 402, 802, subject to MIL
1532		Leeser et al., GPU Implementation of Reverse Coordinate Conversion for Proteins			Subject to IPR estoppel, 402, 802, subject to MIL
1536	10/22/2008	Email from Bates to azs@azs-services.com re an idea from Joe Bates (Carnegie Mellon)	SINGULAR-00060395	SINGULAR-00060395	802, 402, 403
1537	10/11/2012	Email from mbeal@intrinsix.com to jay.rockway@navy.mil re More information on options associated with proposed DARPA project	SINGULAR-00027827	SINGULAR-00027829	802, 402, 403
1538	12/10/2015	Email from Sculley to Bates re approximate computing	SINGULAR-00027552	SINGULAR-00027552	No objection
1541	12/10/2015	Email from Bates to Sculley re approximate computing	SINGULAR-00027520	SINGULAR-00027520	802, 402, 403

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Trial Exhibit No.	Date	Description	Begin Bates	End Bates	Objections
1542	10/23/2008	Email from Barth to Bates re an idea from Joe Bates (Carnegie Mellon)	GOOG-SING-00243075	GOOG-SING-00243076	802, 402, 403
1543	10/31/2008	Email from Bates to Baluja re hello	GOOG-SING-00243116	GOOG-SING-00243117	802, 402, 403
1544	11/6/2008	Email from Bates to Baluja re I mean, let's try Nov 13th	GOOG-SING-00243119	GOOG-SING-00243120	No objection
1545	11/14/2008	Email from Bates to Baluja re post-meeting Thursday	GOOG-SING-00243121	GOOG-SING-00243123	No objection
1546	12/18/2008	Email from Bates to Baluja re Learning "Forgiving" Hash Fcns" Algs and Large Scale Tests	GOOG-SING-00243133	GOOG-SING-00243133	802, 402, 403
1549	3/29/2009	Email from Bates to Baluja re google venture funding?	SINGULAR-00026940	SINGULAR-00026941	802, 402, 403
1550	12/10/2015	Email from Bates to Sculley re approximate computing	SINGULAR-00027005	SINGULAR-00027005	802, 402, 403
1551	12/21/2015	Email from Sculley to Bates re approximate computing	SINGULAR-00027266	SINGULAR-00027266	802, 402, 403
1552	12/10/2015	Email from Bates to Sculley re approximate computing	SINGULAR-00027341	SINGULAR-00027341	802, 402, 403
1553	12/10/2015	Email from Bates to Sculley re approximate computing	SINGULAR-00027400	SINGULAR-00027400	802, 402, 403
1554	12/10/2015	Email from Sculley to Bates re approximate computing	SINGULAR-00027517	SINGULAR-00027517	802, 402, 403
1555	2/12/2017	Email from Bates to Felten re March 9	GOOG-SING-00242430	GOOG-SING-00242430	802, 402, 403
1556		Photos of S1 chip/board sample - HIGHLY CONFIDENTIAL SOURCE CODE			402, 403
1558	3/1/2013	Dean source code changelog file 429825735, subject to protective order			Not previously produced; not disclosed during discovery
1560	10/21/2008	Email from Bates to Baluja re something of possible interest to Google, or you	SINGULAR-00059839	SINGULAR-00059839	No objection
1562		JF Perf Analysis Part II	GOOG-SING-00001929	GOOG-SING-00001989	402, 403
1564		Some Precursor notes: Squid Program	GOOG-SING-00240601	GOOG-SING-00240604	802, 402, 403
1565		JF Numerics: 4. Storage	GOOG-SING-00240063	GOOG-SING-00240065	802, 402, 403
1566		JF Numerics: 3. Vector Units	GOOG-SING-00240062	GOOG-SING-00240062	802, 402, 403
1567		JF Numerics: Approximation Functions	GOOG-SING-00240053	GOOG-SING-00240061	802, 402, 403
1568		Training-Specific Challenges & Opportunities	GOOG-SING-00240972	GOOG-SING-00241010	No objection
1569		SeaStar for Perf	GOOG-SING-00241210	GOOG-SING-00241218	No objection
1570		DeepSea Neural Net Acceleration System Infrastructure Review	GOOG-SING-00240581	GOOG-SING-00240598	402, 403
1571	11/19/2013	DeepSea Madison F2F Notes	GOOG-SING-00240537	GOOG-SING-00240544	802, 402, 403
1572	8/21/2014	SeaStar system Planning Phase Exit	GOOG-SING-00106334	GOOG-SING-00106388	802, 402, 403
1574	6/25/2015	Jellyfish System Planning Phase Exit/Update	GOOG-SING-00241011	GOOG-SING-00241107	402, 403
1575	2/1/2017	Compilation for Matrix Multiplication on Jellyfish	GOOG-SING-00000815	GOOG-SING-00000817	402, 403
1576	6/22/2017	Email from Patterson to Norrie re [jellyfish-sw] Re: The Volta MEGATHREAD	GOOG-SING-00116807	GOOG-SING-00116819	802, 402, 403
1577	5/27/2017	Email from tf-xla@google.com to Digest recipients re Digest for tf-xla@google.com -12 updates in 4 topics	GOOG-SING-00035760	GOOG-SING-00035768	802, 402, 403
1578	7/19/2019	MLPerf 0.6 Performance optimization, analysis & future	GOOG-SING-00232170	GOOG-SING-00232212	802, 402, 403
1580		NVIDIA Developer - CUDA Toolkit	SINGULAR-00057029	SINGULAR-00057035	No objection
1581	5/1/2019	Email from Chen to Zhang re MLPerf TPU Submission Status Update 4/30/2019	GOOG-SING-00079142	GOOG-SING-00079145	802, 402
1582		Outline Why ML benchmarking?	GOOG-SING-00215103	GOOG-SING-00215129	802, 402, 403
1583	12/12/2018	MLPerf TPU Final Submission	GOOG-SING-00078116	GOOG-SING-00078156	802, 402, 403
1584	03/00/2019	Platform for Machine Learning - v2	GOOG-SING-00003752	GOOG-SING-00003780	No objection
1585		Global vs. ROW Chip Data	GOOG-SING-00243996	GOOG-SING-00243997	Objections reserved